

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
17 May 2001 (17.05.2001)

PCT

(10) International Publication Number
WO 01/34091 A3

- (51) International Patent Classification⁷: C12N 15/63. (74) Agent: G. E. EHRLICH (1995) LTD.; 28 Bezalel Street, 52521 Ramat Gan (IL).
- (21) International Application Number: PCT/IL00/00708
- (22) International Filing Date:
2 November 2000 (02.11.2000)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/164,140 8 November 1999 (08.11.1999) US
60/166,389 18 November 1999 (18.11.1999) US
- (71) Applicants (*for all designated States except US*): CBD TECHNOLOGIES LTD. [IL/IL]; Park Tamar, 2 Pekeris, 4th Floor, P.O. Box 199, 76100 Rehovot (IL). YISSUM RESEARCH DEVELOPMENT COMPANY OF THE HEBREW UNIVERSITY OF JERUSALEM [IL/IL]; P.O.Box 4279, 46 Jabotinsky Street, 91042 Jerusalem (IL).
- (72) Inventors; and
- (75) Inventors/Applicants (*for US only*): LEVY, Ilan [IL/IL]; 16 Kfar Hari"i, 79830 Kfar Hari"i (IL). NUSSI-NOVITCH, Amos [IL/IL]; Herman Mass 3, 76566 Rehovot (IL). SHOSEYOV, Oded [IL/IL]; 5 Haerez Street, 72910 Karme Yossef (IL).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- Published:
— with international search report
- (88) Date of publication of the international search report:
17 January 2002
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: MODIFICATION OF POLYSACCHARIDE CONTAINING MATERIALS

(57) Abstract: Compositions for cross-linking and/or modifying the properties of polysaccharide containing materials are provided. Methods for cross-linking polysaccharide containing materials include the step of treating polysaccharide structures with a PBD fusion protein. Properties of polysaccharide containing materials can be functionalized by treatment with PBD fusion proteins comprising a functional moiety. Polysaccharide containing materials such as paper and textiles with increased wet strengths and/or elasticity are described.

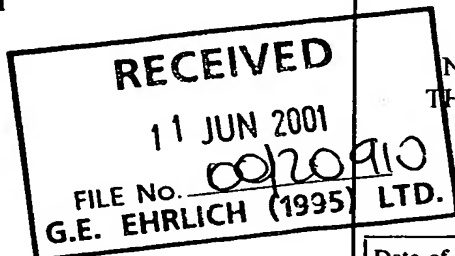
WO 01/34091 A3

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To: G. E. ERLICH (1995) LTD.
28 BEZALEL STREET
52 521 RAMAT GAN
ISRAEL

PCT



NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT
OR THE DECLARATION

(PCT Rule 44.1)

| | |
|---|---|
| Applicant's or agent's file reference 00/20910 | Date of Mailing (day/month/year) 04 JUN 2001 |
| International application No. PCT/IL00/00708 | International filing date (day/month/year) 02 NOVEMBER 2000 |
| Applicant CBD TECHNOLOGIES LTD. | |

1. ☒ The applicant is hereby notified that the international search report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the international search report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.
☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in rules 90 bis 1 and 90 bis 3, respectively, before the completion of the technical preparations for international publication.

Within 19 months from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

| | |
|---|--|
| Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230 | Authorized officer LEIGH C. MAIER <i>Leigh C. Maier</i> Telephone No. (703) 308-1235 |
|---|--|

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

| | | |
|---|--|---|
| Applicant's or agent's file reference 00/20910 | FOR FURTHER ACTION | see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below. |
| International application No. PCT/IL00/00708 | International filing date (day/month/year) 02 NOVEMBER 2000 | (Earliest) Priority Date (day/month/year) 08 NOVEMBER 1999 |
| Applicant CBD TECHNOLOGIES LTD. | | |

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 5 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☒ Unity of invention is lacking (See Box II).

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No. _____

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

☒ None of the figures.

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Please See Extra Sheet.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-49 and 105

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
☐ No protest accompanied the payment of additional search fees.

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING

This ISA found multiple inventions as follows:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I, claim(s) 1-49 and 105, drawn to a process of manufacturing a generic polysaccharide-containing material (PCM) comprising contacting the polysaccharide structures of the PCM with a generic composition containing a polysaccharide binding domain (PBD).

Group II, claim(s) 50-102, drawn to a composition-of-matter comprising a generic PCM and a generic composition containing a PBD with the PBD being bound to the polysaccharide structures of the PCM.

Group III, claim(s) 103 and 104, drawn to a nucleic acid construct comprising a polynucleotide encoding a fusion protein including at least two PBDs.

The inventions listed as Groups I, II, and III do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: There is no novel, common technical feature contributed by the applicant that links the three groups. All the groups contain some component with one or more polysaccharide binding domains. Although group II is a nucleic acid construct encoding a fusion protein including two polysaccharide binding domains, groups I and II recite unspecified polysaccharide binding domain(s). Compositions comprising polysaccharide binding domains are known in the art and therefore not novel. See, for example, Kilburn et al (US 5,137,819).

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL00/00708

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : C12N 15/63; C07K 19/00

US CL : 435/69.7, 252.3; 436/501, 512, 530

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 435/69.7, 252.3; 436/501, 512, 530

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EAST

search terms: fusion protein, (carbohydrate/cellulose/chitin) binding domain

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---------------|--|--|
| X | US 5,719,044 A (SHOSEYOV et al) 17 February 1998, see entire reference | 1-49 |
| X | US 5,856,201 A (SHOSEYOV et al) 05 January 1999, see entire reference | 1-49 |
| X --- Y | US 5,874,308 A (KILBURN et al) 23 February 1999, see entire reference | 1, 4, 5, 11-17, 43-49 --- 2, 3, 6-10, 18-42 |
| X --- Y | US 5,137,819 A (KILBURN et al) 11 August 1992, see entire reference | 1, 4, 5, 11-17 --- 2, 3, 6-10, 18-49 |

☒ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

| | |
|---|--|
| * Special categories of cited documents: | *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention |
| *A* document defining the general state of the art which is not considered to be of particular relevance | *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone |
| *B* earlier document published on or after the international filing date | *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art |
| *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) | *Z* document member of the same patent family |
| *C* document referring to an oral disclosure, use, exhibition or other means | |
| *P* document published prior to the international filing date but later than the priority date claimed | |

Date of the actual completion of the international search

20 APRIL 2001

Date of mailing of the international search report

04 JUN 2001

 Name and mailing address of the ISA/US
 Commissioner of Patents and Trademarks
 Box PCT
 Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

LEIGH C. MAIER

Telephone No. (703) 308-1235

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL00/00708

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|--|-----------------------|
| A | US 5,866,526 A (OLSEN et al) 02 February 1999, see entire reference | 1-49 |